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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,810	06/20/2005	Grigory Valentinovich Gelikonov	76700/00009	7308
23380 7590 06/08/2007 TUCKER ELLIS & WEST LLP 1150 HUNTINGTON BUILDING 925 EUCLID AVENUE CLEVELAND, OH 44115-1414			EXAMINER COOK, JONATHON	
			ART UNIT 2886	PAPER NUMBER
			MAIL DATE 06/08/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/516,810	Applicant(s) GELIKONOV ET AL.	
	Examiner Jonathon D. Cook	Art Unit 2886	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☒ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 December 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Drawing Objections

Figures 8-10, & 19 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification Objections

The disclosure is objected to because of the following informalities: Repeatedly throughout the disclosure the word 'substantially' is misspelled 'substantionally'.

Appropriate correction is required.

Claim Objections

Claims 5 & 6 are objected to because of the following informalities: In claim 5 recites on line 1, "the object s a" should be changed to --the object is a--.

Claims 6 is objected to due to its dependency.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claim 1-35** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding **Claim 1** , the applicant claims *that scanning the low coherence optical radiation over a transverse scanning surface is, "in compliance with a predetermined rule."* This limitation is indefinite and confusing because the metes and bounds of what is being claimed are not clearly defined. For matters of prosecution the examiner shall construe the predetermined rule to determine how close to orthogonal the radiation propagation must be to the transverse scanning surface.

Regarding **Claims 8 & 21**, the applicant claims *that the optical system of the delivering device is, "designed having a quality of eliminating the transverse scanning related aberration of the optical length of the measuring arm."* This limitation is confusing because the functional limitation is merely suggested by the phrase and therefore not a positively claimed limitation of the optical system. For purposes of examination the examiner will construe that the placement of the positive focal power lenses, as taught in the specification, is how the optical system eliminates the aberration.

Regarding **Claim 14** , the applicant claims that *the delivering device for low coherence optical radiation is, "designed as an optical fiber probe."* This limitation is confusing because the "optical fiber probe" is merely suggested by the phrase and not positively limiting.

Regarding **Claim 16** , the applicant claims that *the device for longitudinal scanning is, "designed to provide altering the optical length of the part of the measuring arm..."* This limitation is confusing because the functional limitation of the device is merely suggested by the phrase and therefore not a positively claimed limitation of the optical system.

These claims do not clearly set forth the metes and bounds of the patent protection desired, see MPEP 2111.04.

Claims 2-7, 9-13, 15, 17-20, & 22-35 are also rejected due to their dependencies.

Claim 30 recites the limitations:

"the normal line" in line 1;

"the outer surface" in lines 1 & 2;

"the divergence angle" in lines 3 & 4;

"the place of its intersection" in line 4;

There are insufficient antecedent basis for these limitations in the claim.

Claim 31 is also rejected due to its dependency.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 8-29 & 32-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over **Applicant's Admitted Prior Art (AAPA)**.

Regarding **Claims 8, 11-14, 21, & 24-26**, the AAPA described in the instant application discloses and shows in **figs. 8-10** an apparatus for imaging an object comprising:

*a source of low coherence light (**Page 1, line 13**);*

*an interferometer with a beam splitter and optically coupled measuring and reference arm (**Page 1, lines 16-18**);*

*at least one photodetector with a data processing and displaying unit (**Page 1, lines 14-15**);*

*and the measuring arm including a measuring probe (applicant's delivering device) (**Page 1, lines 18-20**);*

*the delivering device for low coherence optical radiation is designed as an optical fiber probe. The optical fiber probe comprises an optical fiber, which is positioned allowing for the low coherence optical radiation to pass from the proximal end of the optical fiber probe to its distal end (**Page 3, lines 5-8**);*

*an optical system (**Page 3, line 8**);*

*and a system for transverse scanning of the low coherence optical radiation (**Page 3, lines 8-9**);*

*The optical system is optically coupled with the optical fiber and is used for focusing the low coherence optical radiation onto the object. The optical system comprises at least a first lens component with positive focal power (**33**) and shows a second (**32**) in **figs. 9 & 10**. The optical fiber is incorporated into the transverse*

scanning system, which is arranged capable of moving the end face of the distal part of the optical fiber over the transverse scanning surface in a direction approximately perpendicular to the own axis of the optical fiber (Page 3, lines 9-14);

The AAPA fails to disclose, the optical system being designed having a quality of eliminating the transverse scanning aberration of the optical path length of the measuring arm, that the first and second lens components of the optical system are positioned substantially confocal, the first lens component of the optical system is placed at a distance substantially equal to the focal length of the first lens component from the transverse scanning surface, while the distance between the first and second lens components of the optical system is diverse from that corresponding to a substantially confocal position of the lens components by a value $\delta 1$, which is related with the focal length $F1$ of the first lens component and the radius of curvature R of the transverse scanning surface by the following relation: $\delta 1 \cong (F1)^2/R$, and also that the first lens component of the optical system is offset by a distance $\delta 2$ from the position at which the distance from the first lens component to the transverse scanning surface is substantially equal to the focal length $F1$ of the first lens component, while the distance between the first and second lens components of the optical system is diverse from the distance corresponding to the substantially confocal position of the lens components by a value $\delta 3$, which is given by the relation: $\delta 3 \cong (F1)^2/(R+\delta 2)$

However, all of the limitations above are merely optimization of lens positioning and it would have been obvious to one of ordinary skill in art to use the lenses

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separated from each other and the measured object at the ranges as claimed because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Therefore, it would have at least been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of the AAPA with the optical system being designed having a quality of eliminating the transverse scanning aberration of the optical path length of the measuring arm by the placement of its positive focal power lenses for several advantages such as to provide as ideally focused an image as possible.

Regarding **Claims 9 & 22**, the AAPA discloses *in the case when the transverse scanning surface has a curvature (applicant's non-zero curvature) (Page 4, line 15);*

Regarding **Claims 10 & 23**, the AAPA discloses and shows in **fig. 9** that the optical fiber in the probe serving as a flexible cantilever (**Page 4, line 16**), by definition a cantilever must be fixed at some point to a rigid structural member, thus the limitation of being attached to a bearing support is met.

Regarding **Claim 15**, the AAPA discloses that *Longitudinal scanning of the object is performed by connecting the reference mirror with an element that provides mechanical movement of the reference mirror (applicant's device for longitudinal scanning) (Page 1, lines 20-22);*

Regarding **Claims 16, 19, & 32**, the AAPA discloses *longitudinal scanning of the object is performed by varying the difference in optical path lengths for the low coherence optical radiation directed towards the object and directed along the reference optical path and by fixing the position of the reference mirror and performing longitudinal scanning with the aid of a piezoelectric scanning element;*

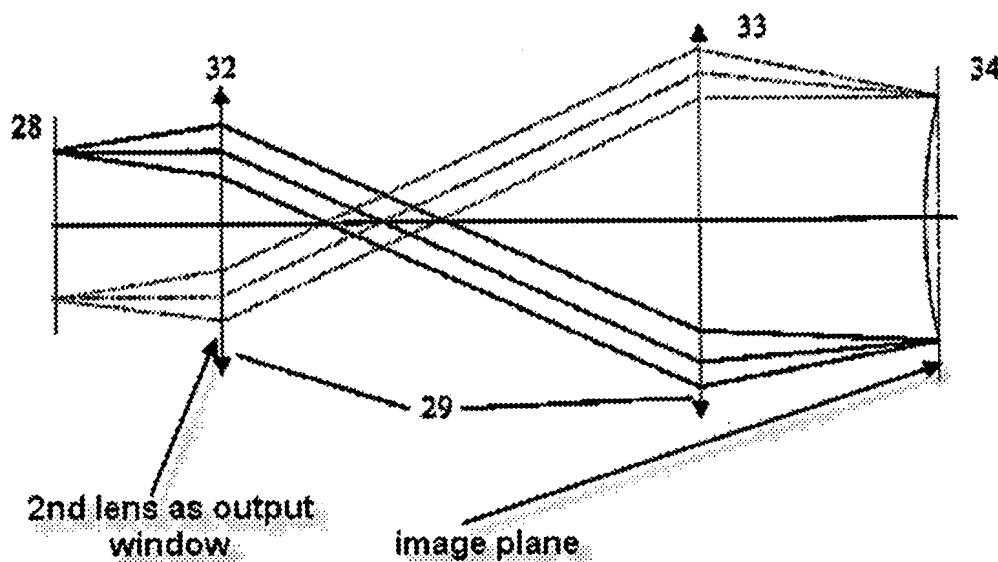
the AAPA fails to explicitly teach altering the optical path length of the part of the measuring arm located between the transverse scanning surface and the optical system, or that the device for longitudinal scanning is placed within the delivering device;

However, it would have at least been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of the AAPA with altering the optical path length of the part of the measuring arm located between the transverse scanning surface and the optical system, or that the device for longitudinal scanning is placed within the delivering device because rearrangement of parts was held to have been obvious. In re Japikse 86 USPQ 70 (CCPA 1950);

Regarding **Claims 17, 18, 33, & 34**, the AAPA discloses *imaging an object*, considering that in these claims the magnification is entirely dependent in these cases on either of the indices of refraction N_1 or N_2 , and not upon any aspect of the apparatus the examiner construes that magnification is an intrinsic property of the object being scanned or the medium between it and the apparatus and thus the limitations are met by the AAPA apparatus disclosed.

Regarding **Claim 27**, the AAPA discloses *known measuring probes are designed typically as an optical fiber probe comprising an optical fiber positioned in such a way, that low coherence optical radiation can pass from its proximal end to its distal end, and an optical system which focuses the low coherence optical radiation on the object. The optical system includes at least one lens component with positive focal power. The measuring probe includes also a system for transverse scanning of the low coherence optical radiation. The measuring probe typically has an elongated body with a throughhole extending therethrough, wherein an optical fiber extends (Page 2, lines 2-8);*

Regarding **Claims 28 & 29**, the AAPA discloses and shows in **fig. 9** (see below)



(modified figure 9)

that the 2nd lens functions as the output window and is near the image plane of the end face of the distal part of the optical fiber;

6. Claims 20 & 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over **AAPA** in view of **Swanson et al** (US PAT 6,445,939) (Swanson).

Regarding **Claims 20 & 35**, the AAPA discloses the aforementioned optical fiber;

The AAPA fails to disclose a microlens rigidly attached to the optical fiber.

However, Swanson teaches and shows in **figs. 2A-E** *optical fiber-lens systems having different types of microlenses (2) that are rigidly attached to the fiber*;

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of the AAPA with the microlens rigidly attached to the fiber as in the teachings of Swanson because medical diagnostic techniques which rely on measuring the optical properties of a narrow, twisting lumen (e.g., small arteries and veins) or a small space (e.g., pulmonary airways) require ultra-small optical probes. These probes in turn require ultra-small imaging lenses (**Swanson, Column 1, lines 14-18**).

Allowable Subject Matter

Claim 1 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Claims 30-31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

As to **Claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious providing a constant propagation time for the low coherence optical radiation propagating from a given point of the transverse scanning surface to a corresponding conjugate point of the image plane, in combination with the rest of the limitations of the claim.

As to **Claim 30**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a normal line to an outer surface of the output window of the delivering device is oriented at an angle to the direction of incidence of the low coherence optical radiation on the outer surface, the angle exceeding a divergence angle of the low coherence optical radiation at a place of its intersection with the outer surface, in combination with the rest of the limitations of the claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathon D. Cook whose telephone number is (571)270-1323. The examiner can normally be reached on Mon-Fri 9:00am to 5:30pm.

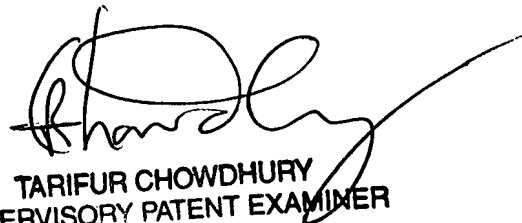
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on (571)272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jonathon Cook
Patent Examiner
AU: 2886
June 1st, 2007

J.C.



TARIFUR CHOWDHURY
SUPERVISORY PATENT EXAMINER